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ABSTRACT

Test-taking intervention procedures were implemented for minority premedical students. The intent of the intervention was to modify expected performances on the science subtest of the Medical College Admission Test (MCAT). The group used to determine the effectiveness of the test intervention procedures consisted of 11 students who had previously taken the MCAT. A significant difference was observed for the MCAT administration after test intervention; the mean increase was 90.91 points. The results suggest that outcomes associated with intervention related to standardized examinations can have vast implications for minority students, particularly with respect to access to educational and career opportunities, in those areas where emphasis is placed on standardized test performances. (Author/GK)

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TEST-TAKING INTERVENTION:

ITS EFFECTS ON MINORITY STUDENTS' MCAT SCORES

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ABSTRACT

Test-taking intervention procedures were implemented for minority premedical students. The intent of the intervention was to modify expected performances on the science subtest of the Medical College Admissions Test (MCAT). The group used to determine the effectiveness of the test intervention procedures consisted of 11 students who had previously taken the MCAT. A significant difference ($p < .0005$) was observed for the MCAT administration after test intervention; the mean increase was 90.91 points.

The results suggest that outcomes associated with intervention related to standardized examinations, can have vast implications for minority students, particularly with respect to access educational and career opportunities, in those areas where emphasis is placed on standardized test performances.

Test-Taking Intervention: Its Effects on Minority Students' MCAT Scores

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Numerous factors have been cited as contributing to the generally depressed performances on standardized tests by minority students. Some of the cited factors have been test biases, deficient educational background, test anxiety, etc. Individuals such as Thorndike (1977) and Hagen (1977) have pointed to the negative influences of a disadvantaged environment. However, one of the more noted factors, but apparently has not been significantly addressed, is the lack of overall test taking experiences by many minority students. A lack of test taking experience would be expected to result in a lack of test sophistication or test-wiseness (TW). In emphasizing the importance of test-taking experience Thorndike (1958) pointed out the significance of familiarity with an understanding of the testing conditions on test performances and the effects that it had on exam performances.

Adverse test performance effects associated with test-takers unfamiliarity with testing conditions or their lack of TW have been discussed by Millman, Bishop, and Ebel (1965) and also Stanley (1971). In addition, a study by Millman and Setijadi (1966) demonstrated the effects of TW and test familiarity when performance of American Indonesian students were compared on a multiple-choice test. Although two other cognitive assessments used in the study indicated no significant difference in knowledge between the two groups, the American students scored significantly higher on an administered multiple-choice test. The rationale

for the performance differences was that the Indonesian students were unfamiliar with multiple-choice tests while the American students' experiences with such tests were fairly extensive. Thus, the American students (as a result of their familiarity with multiple-choice tests) performed at higher levels.

A number of studies have been conducted that examine the effects of increasing TW, however, most of the investigations involved children, (such as studies by Moore, Schutz, and Baker (1966), Wahlstrom and Boermasa (1968), Oakland (1972), and Callenback (1973)). Two exceptions were Woodley (1973) and Bajtelsmit (1977), both investigated the relationship between TW and performances on examinations by adults. The subjects of this study were young adults who were also members of ethnic minority groups. The study sought to examine the effect on exam performance of a modified TW program emphasizing the learning of content related to a particular test.

Although it is generally recognized that test taking skills are associated with improved performances, the contention of many investigators is that the differences in gain scores are usually negligible. Millman and associates (1965) pointed out that differences in test gain scores between groups acquiring test taking skills and those who did not, are usually less than the standard error of the test. Furthermore, the tests Millman et al. discussed were primarily teacher-made types which more readily lended themselves to TW strategies. Bejtelsmit (1977) reported that in performances on a well prepared standardized test, no significant differences were found between participants who received TW training and those who did not. In addition, results from earlier studies examining effects of coaching

(nonspecified assistance) and practice (repeated test taking) on standardized exams, have been mixed. For instance, Yates (1952) and Longstaff (1954), found significant differences, however, Dyers (1953) and Hills (1961) failed to find differences. For this study, instead of relying one one method in an attempt to achieve gains on a professionaly prepared standardized norm-referenced test, TW training was combined with learning principles so that learning both relevant content and appropriate test skills would be accomplished simultaneously. This overall approach was termed test performance intervention since the purpose was to facilitate improved test performances through effective learning procedures and the acquisition of sould test-taking approaches. The objective of this study was to determine if the combination approach--test performance intervention--would result in significant gains on the science subtest of the Medical College Admissions Test (MCAT).

METHOD

Subjects

Eleven undergraduate and post-graduate minority premedical students (7 males and 4 females) were selected from 18 premedical and predental students enrolled in a summer program at the University of North Carolina at Chapel Hill School of Medicine. The selected participants were all premedical students who had taken the MCAT the previous spring.

Dependent Measure

The science subtest score of the MCAT was the dependent variable. The mean science subtest score attained by the group in the past spring was compared with the group's subsequent performance. The science MCAT was

selected because it was widely recognized as a significant measurable predictor of success in the first two years at U.S. medical schools, and thus was a major criterion used by U.S. medical schools in their admissions procedures. [The parallel form-test reliability for the science MCAT over a five year period in which this test was administered, was in the range of .70 to .75.]

Procedure

The participants attended 10 one and a half hour sessions designed to teach test-taking skills and to provide content review relevant to the science MCAT. Simulated tests containing items with formats similar to those found on the science MCAT were used as instructional and practice material. The tests were used to teach efficacious test-taking skills and to allow the students to practice and reinforce the learned techniques and strategies. The primary areas addressed in the test-taking intervention sessions were: 1) general test taking procedures that reduce unwarranted errors, 2) time management, 3) the recognition and use of cues, 4) systematic procedures for guessing, 5) deductive reasoning, and 6) the use of logic and inquiry processes for problem solving.

After being introduced to concepts of effective test-taking techniques and strategies, the students practiced the learned skills on the simulated exams and receive immediate feedback on the exam items. Since another important feature was the review of science content, the students were strongly urged to take a self-directed approach and review science material relevant to the MCAT. This generally entailed going over textbooks and notes of past science courses. In addition, during the test intervention sessions, brief reviews in biology, physics, and general and

orgainic chemistry were provided whenever desired by the students. The format allowed the simulated exams to be used as instruments for: 1) learning effective test taking-skills, and 2) as a means of self-assessment regarding science content. The dual objectives were to reinforce the use of good test-taking skills and the acquisition of science knowledge. However, the latter was entirely at the discretion of the study.

Results

Means and standard deviations of pre- and post-test intervention were computed for the science MCAT. Differences between means were analyzed by the direct-difference t test. As shown in Table I, a gain of 90.91 points was observed after test intervention, indicating a very significant increase despite the relatively small number of students used in the study, $t(10) = 7.89$, $p < .0005$ (one tailed).

INSERT TABLE I HERE

Discussion

Although a number of studies have investigated the effects of the improvement of test-taking skills on actual test performances, the impact on standardized test scores has been inconclusive. Unquestionably, a larger sample size would have been desired, however, despite the small sample size, the approach used in this study has promise as suggested by the observed gain scores on a professionally prepared norm-referenced standardized examination (MCAT Science subtest).

Effective test-taking is a learned skill as demonstrated by a number of TW studies. This, exposure and practice plans an important role in

the development of good test-taking skills. Individuals having relatively little exposure to psychometrically sound multiple choice items should be expected to generally perform at lower levels on standardized exams than individuals with the benefit of relatively consistent exposure to those types of exams. That assumption is in concert with the conclusion drawn by the Millman and Setijadi (1966) study. Therefore, the opportunity to gain exposure to items similar to those on an upcoming important standardized exam could be crucial for a number of individuals unfamiliar with the type of items found in the exam. Earlier exposure of sound test-taking techniques would allow individuals to uncover and correct procedural mistakes they might be inclined to make during the actual testing situation. Since test performances do play such a crucial role in our society, those who must take important tests should be given the opportunity to perform up to their capability and not be penalized for a lack of test-taking sophistication.

The procedures in this study provided both practice and test-taking skills instruction, but another major focus was the learning of subject matter. Thus, the sessions were developed so that the students would not only acquire efficient test-taking skills but would also learn content related to the domain that was tested. Within this context, learning subject matter content was perceived as important as learning test-taking skills. The question should be not which of these has the greatest impact--the learned test-taking skills or learned content--but would the combination of the two manifest increased performances. The results associated with the combination approach were favorable as indicated by a mean gain of 91 points. The usual performance trend for students retaking

the MCAT is an increase in the science subtest score, but the usual gains average no more than approximately 25 points. In this study, the observed 91 point mean increase far surpassed the expected gains by over 65 points.

If performances on standardized examinations, like the MCAT, can be positively influenced with general consistency as suggested by this study, then the implications are vast. This holds particularly true for those individuals with histories of depressed performances on standardized examinations. Since a larger proportion of minority students have traditionally demonstrated lowered standardized test performances, methods of providing those students with sufficient test-taking skills along with mechanisms to reinforce learning, as was done in the test inervention sessions, should be educationally and socially beneficial. It appears that effective test intervention, particularly if it is coupled with the more important factor of quality instruction, could be instrumental in providing significant numbers of students greater access to wider educational opportunities and professional careers. This would be of specific importance in those areas where examination performance is so crucial in gaining requisite preparations. Needless to say this is an area that needs exploring. Of special interest should be the effects of test intervention methods that are provided over longer time intervals, and how effectively are learned test-taking skills retained over time.

Additional investigations should certainly be conducted in looking at the effects that test-performance intervention has a test scores. A number of areas in test taking and performance outcomes deserve the close examination that this study will hopefully encourage, such as looking at how closely ability and knowledge are related to specific standardized test scores.

TABLE I

Means and Standard Deviation of MCAT
Science Scores Before and After Test-Performance Intervention

Pre Test-Performance Intervention		Post Test-Performance Intervention		
M	SD	M	SD	t
412.27	36.90	503.18	63.69	7.89***

***p < .005

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